

less, and, last but not least, in a disease which attacks the face the cosmetic results are wonderful. The skin of the areas treated is soft, supple and pale, and in some cases so nearly resembles the healthy skin that it requires careful observation to detect the difference. As we have already mentioned, the drawbacks are the time and the expense, and the impossibility of treating the mucous surfaces. If a cheaper method of application, with shorter exposures and the possibility of treating a larger area at one sitting, is introduced, there is no doubt that the light treatment will be used in every hospital where a suitable electrical installation is obtainable.

NOTES.

WE deeply regret to record that Prof. P. G. Tait, late professor of natural philosophy in Edinburgh University, died on Thursday last, July 4, at seventy years of age.

A STATUE of Chevreul is to be unveiled to-day at the Paris Museum of Natural History.

THE death is announced of Prof. T. H. Safford, professor of astronomy in Williams College, Williamstown, Mass., U.S.A. Prof. Safford was born in 1836 and was renowned for his mathematical attainments as well as for his work in preparing catalogues of stars.

THE death of Sir Cuthbert Peek, at the early age of forty-six, will be regretted in scientific circles, for he was a liberal patron of scientific work as well as an active worker. He was interested in many branches of science, being a Fellow of the Royal Astronomical, Geographical, Meteorological and other Societies, and of the Anthropological Institute. He also served on the councils of several scientific societies. He maintained a well-equipped observatory at Rousdon, near Lyme Regis, Devon, and the meteorological and astronomical observations made there have frequently been referred to in these columns. Science can ill afford to lose one who was in such complete sympathy with its interests.

TIDINGS have been received of the death of Dr. Joseph Le Conte, professor of geology and natural history in the University of California. He was born in Georgia on February 26, 1823, and was a son of Dr. Lewis Le Conte, the botanist. Having studied for the medical profession, and taken the degree of M.D. at New York in 1845, he settled at Macon as a physician. Science, and particularly geology, however, attracted much of his attention. In 1856 he was appointed professor of chemistry and geology in South Carolina College, and he resigned this post in 1869 for the professorship at San Francisco. He was the author of a useful work on the "Elements of Geology" (1878), of which a revised edition was issued in 1889, and he gave special attention to the study of volcanic and also of glacial phenomena.

THE International Association for the Advancement of Science, Arts and Education will hold its second international meeting at Glasgow in the University and in the International Exhibition from July 29 to September 27.

THE *Times* correspondent at St. Petersburg states that the Imperial Geographical Society is sending an expedition to the Pamir under the leadership of Dr. Fedshenko with the object of making geological, botanical and zoological researches.

THE Institution of Mining and Metallurgy announce the intention to award two premiums of twenty-five guineas each for the best papers on the comparative merits of circular and rectangular shafts respectively, for mines of great depth. An annual prize of ten guineas will also be awarded for the best paper upon any

subject connected with the treatment of ore. Particulars can be obtained from the secretary of the Institution, Broad-street House, London, E.C.

A CORRESPONDENT sends us the following translation of an article which appeared in the *Neue Freie Presse* of Vienna, and was translated in the Copenhagen Journal *Dannebrog* on June 28, upon the removal of Tycho Brahe's remains from his tomb. This is the first report we have seen of the event:—"On the occasion of the 300th anniversary of Tycho Brahe's death the Prague Town Council decided to gather together the remains of the celebrated astronomer, which were in the Teyn Church, and bury them anew. Under the guidance of Mr. Herlein this operation was commenced yesterday. After having lifted the stone block on the monument, which is situated near the first column in the nave and which bears a full-length effigy of the great astronomer, a semi-collapsed arch was found, and on removing the stones two mouldering coffins were seen. On the following day a committee met to determine whether these bodies were those of Tycho Brahe and his wife. Two workmen with candles descended into the vault and removed the debris which covered the coffins, the wood of which was quite rotten and fell to pieces at every rough touch. About 10 a.m. the lid of the first coffin was free to be removed. It was a surprising sight that met the eye; the body in the coffin was a wonderful likeness of the effigy on the monument. The head was slightly turned to one side, the bones of the face and the peaked Spanish beard being well preserved. The head was covered with a skull cap, and the neck was surrounded by a Spanish ruff which, like the remainder of the clothing, had suffered little during the 300 years since Tycho Brahe was laid in his last resting place. The feet were shod in long cavalry boots reaching up over the knee. That the body was Tycho Brahe's was also seen from the absence of the nose; Tycho lost this organ in a duel and wore a silver one in its place. Amongst the rubbish was found a silver wreath and spray of flowers. The construction of the grave was rather remarkable, the stones being laid loosely over one another. This is all the more astonishing seeing Tycho Brahe was buried with great pomp and honours, but it is supposed that the vault broke down during the restoration of the church in 1721."

DR. C. D. WALCOTT, director of the U.S. Geological Survey, contributes to *Science* of June 29 a long article on the relations of the national Government to higher education and research. The U.S. Congress has generously aided technical and higher education by grants of land to States and territories for educational purposes. This policy was inaugurated in 1787, when a contract was entered into between the Ohio Company and the Board of Treasury of the United States, whereby lot 16 in every township was given for the maintenance of public schools and not more than two complete townships were given perpetually for the purpose of a university, the land to be applied to the purpose by the legislature of the State. The most important act, after that of 1787, was that of 1862, granting land for the endowment of colleges for teaching agriculture and the mechanical arts. The total grants of land amount to about 20,000 square miles, about 4000 square miles of which are for the establishment of higher institutions of learning, and 16,000 square miles are in aid of "colleges for the benefit of agriculture and the mechanical arts." In addition, Congress now grants annually to each of the forty-five States the sum of 5000*l.*, which is expended under the direction of State boards. The policy of the U.S. Government has thus been to relegate the direct control of education to the States, aiding them in this work by grants of land, and in the case of technical education by grants of money also. The Government has carried on original research for its own purposes in the district of Columbia, through

grants of money to its various scientific and technical bureaus. Of the total sum granted to these departments during the fiscal year 1901, more than 400,000% or about 25 per cent. of the grant is available for scientific and research work and for higher education. The city of Washington possesses vast resources for work of this kind, and Congress has lately enacted that all the collections and museums in the city shall be available for higher education and research. The Washington Memorial Institution, which will begin work in three or four months, under the direction of Dr. Gilman, will suggest lines of investigation and coordinate the work that is being done by Government officials and private students.

As already announced, the British Congress on Tuberculosis will be opened at St. James's Hall on July 22. The Duke of Cambridge will inaugurate the congress on behalf of the King, who is patron. The work of the congress will be divided among four sections, viz.: (1) State and municipal—president, Sir Herbert Maxwell, F.R.S.; (2) medical, including climatology and sanitaria—president, Sir R. Douglas Powell; (3) pathology, including bacteriology—president, Prof. Sims Woodhead; (4) veterinary (tuberculosis in animals)—president, Sir George Brown. On Tuesday, July 23, the sections will begin their work, and at the second general meeting on the afternoon of this day Prof. R. Koch, of Berlin, will give an address. The chair will be taken by Lord Lister. On July 24, there will be, in the morning, a joint meeting of the medicine and pathology sections for a discussion on tuberculin. Prof. Brouardel, of Paris, will address the third general meeting in the afternoon. At this meeting Mr. Henry Chaplin, M.P., will be the chairman. The fourth general meeting, to be held on Thursday, July 25, will be addressed by Prof. McFadyean, of the Royal Veterinary College, and Lord Spencer will preside. The following are among the officers of the congress:—President of organising council, the Earl of Derby; chairman of organising council, Sir William Broadbent, F.R.S.; chairman of general purposes committee, Prof. Clifford Allbutt, F.R.S.; chairman of reception committee, Sir James Crichton-Browne, F.R.S.; hon. secretary-general, Mr. Malcolm Morris; hon. assistant secretary, Sir Arthur Trendell.

We have received from the Deutsche Seewarte part x. of their colonial observations. This number contains a very valuable series of meteorological observations made in German East Africa, collected and discussed by Dr. Hans Maurer. Regular observations were begun there in 1891, but were not continuous owing to some unfortunate mishaps to the observers and to the difficulty of controlling the work at such a distance. Dr. Maurer was therefore dispatched by the German Government in 1895 to establish and superintend a network of stations, with the result that a very valuable series of hourly observations, from November 1895 to March 1899, have been obtained at several stations, and have been carefully collated and published in part i. of the work, including the harmonic constituents of the daily barometric oscillation for the monthly means. The second part of the present volume also contains some observations made before 1895 but not yet published, and a list of the works which contain observations previously published. The work is a most useful contribution to the climate of German East Africa.

It has often been said that the study of electrochemistry is very much neglected in this country, and, indeed, until quite recently there was not, we think, to be found in any of our technical colleges a laboratory purposely designed for electrochemical and electrometallurgical work. Now, however, Owens College, Manchester, possesses in its new Physical Institute a laboratory thoroughly equipped for these purposes. Two rooms have been set apart for electrochemical work, the rooms chosen

being in close proximity to the dynamo-room, from which currents up to 1000 amperes are obtainable. In addition to the ordinary equipment of a chemical laboratory leads have been run round the benches, so that every student has ready to his hand a supply of current at 2, 4, 6, 8 or 10 volts pressure. The apparatus requiring heavy currents, such as furnaces or large electrolytic tanks, is arranged on a bench at the end of the room at which the main leads from the dynamo-room enter. Bare copper wires are used for the conductors, the film of oxide and sulphide which forms on them protecting them sufficiently from too rapid corrosion. Now that Owens College has set so good an example, it is to be hoped that it will not be long before the other technical colleges recognise the need of efficient means of training students in this very important subject. Considering that a supply of cheap electric power is scarce, England may not be perhaps the most suitable country for electrochemical industries, but its backwardness in their development is undoubtedly aggravated by the lack of opportunity for young engineers to study the principles of electrochemistry and electrometallurgy.

NEWCASTLE-ON-TYNE may be congratulated on being the first place in the United Kingdom to see the inauguration of the practice of supplying electricity "in bulk." The large power station of the Newcastle-on-Tyne Electric Supply Co. was formally opened by Lord Kelvin on the 18th of last month, and the credit for the successful starting of the system must be shared jointly by this company and the Walker and Wallsend Union Gas Co. This latter company are taking a large supply from the Newcastle company and distributing it throughout the area under their control, which includes a number of big engineering and other works which require a supply of electricity for motive power or lighting. Many of these works make use of so much power that it has been found necessary to erect a separate substation in each case, power being supplied at high pressure to the substation and thence, after the pressure has been reduced, being distributed throughout the works. Supply is obtainable on either the continuous-current or three-phase systems. For the purpose of supplying the three-phase current, there are to be at the Neptune Bank station four 700 kw. sets generating at 5500 volts, and a 1500 kw. Parsons turbo-alternator. The continuous current is supplied by four 100 kw. dynamos generating at 240 volts; there is also a 150 kw. motor generator taking three-phase current at 5500 volts and generating continuous current at 240 volts, but designed so that it can be used in the opposite direction—that is to say, being driven by the continuous current and generating three-phase currents. A site has been obtained for the erection of another generating station in which to put up new machinery when the present station becomes fully loaded.

We have received from the Meteorological Reporter to the Government of India a report on cloud observations and measurements in the plains of the North-Western Provinces of India during the period December 1898 to March 1900 (*Indian Meteorological Memoirs*, vol. xi, part iii.). The observations were taken and discussed under the superintendence of Mr. E. H. Hill; they include both the heights and movements measured by means of two photogrameters and a Fineman's nephoscope. In the fifteen months under review about 900 pairs of plates were exposed, and from these nearly 1000 calculations of heights of clouds have been made. The measurements have been arranged according to two seasons—June to October (the wet season, including the monsoon months) and November to May (the dry season). In the wet season the mean height of the cirrus was 35,000 feet, and the mean velocity 17.4 miles per hour; in the dry season 41,963 feet, and the mean velocity varied from 79 to 89 miles per hour. The mean height of the cumulus in the wet season was 5450 feet, and in the dry

season (January and February only) 4100 feet, the velocities being respectively 13.7 and 10.2 miles per hour. The maximum velocity of the cirrus was estimated at 282 miles per hour both in February and March.

AN interesting letter by L. Schäfli on approximate integration is reproduced by Herr J. H. Graf in the *Berner Mittheilungen* for 1899, recently sent to us. The letter was written to a friend in explanation of certain difficulties he had experienced in reading Raabe's books on the calculus, and it probably dates from about 1840. It appears to throw some new light on the history of Bernoulli's numbers and functions, besides affording evidence of Schäfli's great power as a mathematician.

IN the *Journal de Physique* for May, M. Bernard Brunhes writes on the entropy of a gaseous mixture in combustion. It has been hitherto regarded as an objection to the use of entropy diagrams that they could not be used in connection with gas and oil engines, on account of the essentially irreversible nature of the explosions and the consequent uncertainty as to whether the entropy of the mixture was calculable or could even be said to exist. M. Brunhes now shows that, under certain well-defined conditions, the entropy is both determinate and calculable.

PROF. ORESTE MURANI points out in the Lombardy *Rendiconti* that a focus-tube at a certain degree of vacuum acts like an "electric valve" for alternating currents, in that it allows the current to pass in one direction but not in the other. The notion of an electric valve appears to have been originally due to Gaugain, and it has been known that a Geissler's tube in which the electrodes have different forms may act in this way. In the case of a focus-tube there appears to be a superior and an inferior limit to the degree of exhaustion at which it acts in this manner, the superior limit corresponding to a pressure of about 0.1 mm. of mercury, and the inferior limit, which has not been determined with such certainty, corresponding to 0.07 mm. Prof. Murani considers that a focus-tube may be used to indicate the sense of a discharge in certain cases where a more direct method is inapplicable; it might be also used to convert an alternating current into a direct one, but the intensity of the latter would be very small.

THE monaural localisation of sound receives treatment at the hands of Prof. James Rowland Angell and Dr. Warner Fite in the *Psychological Review* for May. The paper reports a series of observations on the capacities of auditory localisation in a person entirely deaf in one ear, but parallel observations have in certain cases been made upon a person of normal hearing. So far as it is possible to briefly give some idea of the conclusions, it is shown firstly that the differences in the localising capacity for complex sounds in binaural and monaural hearing are, so far as concerns these subjects, interpretable as chiefly differences in the magnitude of the difference limen for locality rather than as absolute differences in the kind of localising process involved. The experiments amply sustain the introspection of the subject in pointing to qualitative differences in the sounds coming from different directions as the basis of the localisations. Such qualitative differences may be due to the damping or reinforcing of certain partial tones by the organs of the ear and the head, and it is noteworthy that generally sure tones are unlocalisable in monaural hearing. The presence of eye-reflexes was often very marked, and the final localisation was frequently made on the basis of a seeming correspondence between the eye-strains and the supposed direction of the sound. This statement, however, leaves untouched the physiological basis of the eye-movements. Finally, there is no good evidence for supposing that cutaneous sensations play any part in the localisations.

NO. 1654, VOL. 64]

THE thermal conductivity of the living human skin forms the subject of an investigation by Mr. J. Lefèvre in the *Journal de Physique* for June. Regarding the skin as a wall about 2 mm. thick, three coefficients have to be found, namely, the surface conductivity, the true conductivity through the substance forming the skin, and the internal surface conductivity between the skin and the adjoining tissues. To find these it was necessary to determine the rate of flow of heat across a unit area of the skin, and to measure the distribution of temperature from the surface downwards. For the former purpose M. Lefèvre immersed himself in a bath of water which served as a calorimeter, for the second he used thermoelectric elements, that used for subcutaneous observations taking the form of a fine needle. The experiments show that the skin is a bad conductor, its true conductivity being about the same as that of wood, of the same order as that of gutta percha, about 5 or 6 times that of wool and 750 times that of air. The conductivity is only half as great at 5° as at 30° C. The exterior surface-conductivity of the skin in contact with water appears to be approximately independent of the temperature, but the coefficient across the surface separating the skin from the adjoining tissues increases considerably as the temperature falls from 30° to 5°, and the latter increase more than counterbalances the decrease in the true conductivity, so that the loss of heat at 5° C. is twice or thrice as great as it would be according to Newton's law.

THE new number of the *Mittheilungen* of the Vienna Geographical Society contains two papers of interest. Herr H. Anschütz-Kaempfe describes a plan for exploring the Arctic Ocean and reaching the North Pole by means of a submarine vessel. Herr V. von Loziński treats of chemical denudation in relation to geological time, and gives a valuable summary of recent work bearing on this subject. The calculations of Mr. Mellard Reade and von Romer are specially dealt with, and the latter are repeated, with modifications, employing the most recent data of Murray, Gümbel and others.

DR. G. SCHOTT gives, in the *Verhandlungen der Gesellschaft für Erdkunde zu Berlin*, an interesting forecast of some of the oceanographical results of the *Valdivia* Expedition, the full report on which may be expected next winter. The *Valdivia* observations have been combined with older material so as to bring maps of distribution of temperature, as far as possible, up to date, and from these Dr. Schott draws some important general conclusions. In the open ocean three temperature layers are recognised—a surface layer, 0 to 100 metres, in which the distribution is chiefly controlled by horizontal movements; a middle layer, 150 to 800 metres, controlled by vertical movements; and a bottom layer, beyond 1000 metres, in which horizontal movements are again specially important. A "Sprungschicht" occurs in every ocean, its mean depth being 25 to 80 metres in the Atlantic, 90 to 140 metres in the Indian, and 110 to 180 metres in the Pacific Ocean.

THE "Karlseisfeld" was first visited by Friedrich Simony in 1840, and since that date almost every change in the glacier has been carefully observed. Simony made his last photographic survey in 1890, and since his death a survey was made, in 1896, by von Groller. The retreat of the glacier during the five years following made another survey important, and this was accordingly carried out by Freiherr von Hübl. The results are published in the *Abhandlungen* of the Vienna Geographical Society, and, apart from their value as a study of the glacier, they form a model example of the application of modern methods of photographic surveying to work of the kind. The account of the survey forms the first of three parts of a report to be published under the editorship of Herr August von Böhm; the second part is to deal with the history of the glacier, and the third with its present development. In the same number of the

Abhandlungen Dr. Johan Cvijić publishes the second part of his morphological and glacial studies in Bosnia, Herzegovina and Montenegro, dealing with the *Karstpoljen* of Herzegovina and West Bosnia.

IN the *Transactions* of the Edinburgh Geological Society (vol. viii, part i, 1901) Dr. W. Mackie publishes some chemical analyses of Scottish sands and sandstones ranging in age from the Torridon Sandstone to the Blown Sands of Culbin. These analyses show that the proportions of the total alkalis follow fairly closely the results obtained from the proportions of fresh felspar in the several formations. Thus the Torridon Sandstone, an arkose, which contains fresh felspars, gave an average of 4.61 per cent. of alkali, chiefly potash. Soda is hardly represented. Hence the author doubts if such sandstone could be converted by metamorphism into a gneiss as has been suggested. The bearing of his analyses on similar questions is discussed, and he concludes (1) that a silica percentage over 78, an alumina percentage under 11, and a low percentage of lime and of total alkalis, especially of soda relatively to potash, indicate a sedimentary origin of metamorphic rocks; and (2) that a silica percentage not above 78, an alumina percentage not under 11, a high percentage of total alkalis, &c., indicate origin from an igneous rock. Mr. H. M. Cadell contributes to the same *Transactions* an important article on the geology of the Oil Shalefields of the Lothians; and Mr. Herbert Kynaston draws attention to the effects of contact metamorphism round the Cheviot granite.

THE second number of vol. ii. of the *West Indian Bulletin* has just been issued by the Imperial Agricultural Department. It is devoted wholly to a continuation of the full reports of the papers and discussions at the Agricultural Conference held at Barbados in January last. A great deal of the most useful information is brought together in these pages, the subjects dealt with being of a varied character, and not in all cases strictly agricultural. Dr. Alford Nicholls deals with the difficult question of bush fires, which he divides into five classes, approving of some, condemning others. Mr. Watts treats of soils in "orchard" cultivation, and of pine-apple cultivation in Antigua; Mr. Hart of rubber planting in the islands (illustrated); Mr. Sands of the cultivation of onions in Antigua; Mr. Meaden of breeding for beef in Trinidad, and, with Mr. Hart, of zebu cattle in the same island; and Mr. Whitfield Smith of artificial drying of cacao. Dr. Duerden's instructive communication on the marine resources of the British West Indies, which was some time ago issued as an extra number of the *Bulletin*, is reproduced *in extenso*.

THE afforestation of Ireland is advocated by Dr. R. T. Cooper in the *Irish Times* as a means of increasing the value and productiveness of the country. In Ireland there are about five million acres of unproductive land in a total acreage of 20,808,271, every square yard of which could be improved and fertilised by tree cultivation. Yet in all Ireland during the year ending June 1900 only 629 acres were planted with trees, while 1451 acres were cleared of timber. A serious attempt ought to be made to prevent this destruction of forest and recover the immense areas of "bog waste and mountain land" by a scientific distribution of trees.

AN interesting illustration of the practical importance of the recent discovery that leguminous plants possess the power of utilising the free nitrogen of the atmosphere, and thus increasing the nitrogenous constituents of the soil, is furnished by a pamphlet on shade in coffee culture, by Mr. O. F. Cook, being *Bulletin* No. 25 of the U.S. Department of Agriculture (Division of Botany). It seems that coffee growers in Central America, Venezuela and Columbia advocate a certain amount of shade for the coffee plantations, while those in Brazil and the

East Indies do not. Mr. Cook suggests that the explanation of these contrary results lies in the fact that, while in the first-named countries the shade plants employed are almost exclusively leguminous trees and shrubs, in the latter they are chiefly figs, bananas and other non-leguminous plants. Hence the problem is one rather of nutrition than of insolation. A long list is given of the shade plants employed by coffee growers, and the pamphlet is illustrated by a number of photographs.

PROF. F. PLATEAU, of Ghent, has recently published several fresh papers, in the *Annales de la Société Entomologique de Belgique* and the *Mémoires de la Société Zoologique de France*, on the sources of attraction in flowers for insects. His previous conclusion, that insects are but little attracted by bright colours, was confirmed by experiments which showed that brightly coloured stuffs and scintillating metallic objects placed among the leaves had but little attractiveness for insects. With regard to the constancy of insects in visiting the same species of flower only on the same flight, he states that species of *Bombus* are very inconstant; *Apis mellifica* and *Anthidium manicatum* are, on the other hand, remarkably constant; species of *Megachile* and *Coelioxys* less so. The habit of constancy is attributed to a desire on the part of the insect for a saving of labour. The Syrphidae (hover-flies) show a considerable tendency to be attracted by bright colours, whether of flowers or of inanimate objects. To this quality, and not to any æsthetic sense, is to be attributed their habit of hovering over flowers.

A WELL illustrated article by Prof. W. M. Wheeler, bearing the title of "Impostors among Animals," presents to the readers of the July number of *The Century Magazine* some of the leading facts connected with the "mimicry" of animate and inanimate objects by animals, and the consequent adaptation of the latter to their surroundings, in a pleasant and attractive manner. The first illustration shows the marvellous resemblance presented by certain bugs to the rugged bark of the stem on which they dwell, while the second displays the mimicry of orchids by various members of the Orthoptera, which assume a stationary posture with outspread wings on such occasions. Attention is specially drawn to the circumstance that while protectively coloured animals have, as a rule, a simple coloration and quiescent habits—frequently accompanied by the "death-feigning instinct"—those which depend for safety on "warning colours" present the very opposite conditions, being brilliantly and often gaudily coloured, while their habits are calculated to provoke attention and attract observation.

THE current number (vol. lxx. part iii., No. 1) of the *Journal* of the Asiatic Society of Bengal contains several interesting papers on folk customs in India. Captain W. Haig records the origin, the marriage laws, religious observances and funeral rites of the Rangari caste in Barar; in another paper he does the same for the Velama caste, and in a third communication he narrates the legendary account of Shah Abdur-r-Rahman-i-Ghazi, the warrior saint of Barar. Mr. S. Appadorai gives far too brief a paper on the heroic Godlings in Malabar folklore; and the riddles current in Bihar are recorded by Mr. S. C. Mitra. In a very interesting paper, illustrated by four plates, the Rev. P. O. Bodding describes a number of polished stone implements found in the Santal Parganas. These, as almost everywhere else, are believed to be thunderbolts. The Santals believe that a house where such a "thunderbolt" is kept is proof against lightning, and, as in the north of Ireland and elsewhere, they are also supposed to possess remarkable therapeutic power. Water in which a thunderbolt has been rubbed or placed is used, both externally and internally, to cure many ailments.

THE optical establishment of C. P. Goerz, at Friedenau, Berlin, has just produced its 100,000th lens—a Goerz double anastigmat. To have placed upon the photographic market 100,000 anastigmat lenses in eight years (since 1893) is a noteworthy record.

M. MORENA Y ANDA publishes in the *Transactions* of the "Antonio Alzate" Society of Mexico a table showing the diurnal variability of air temperature at Tacubaya for each month of the fifteen years 1884-1898. The hours of observation are 7 a.m., 2 p.m. and 9 p.m.

DR. MAX VERWORN'S "Allgemeine Physiologie" was welcomed as a valuable work when it appeared in 1894, and its scope and character were described in these columns (vol. li., p. 529). The work has been translated into English, French, Russian and Italian, and has taken its place as a standard textbook of general physiology. The third edition has now been published by Herr Gustav Fischer, of Jena.

THE syndics of the Cambridge University Press have undertaken the publication of a work on the fauna and geography of the Maldivé and Laccadive Archipelagoes. An expedition, consisting of Mr. J. Stanley Gardiner, Mr. L. A. Borradaile and Mr. C. Forster Cooper, passed eleven months in these two groups, and the work will contain the scientific results of the visit. The chief object of the expedition was to investigate the interdependence of the physical and biological factors in the formation of atolls and reefs. To this end upwards of 300 dredgings were taken, a large number of soundings were run, and every group of organisms was carefully collected. The land fauna was carefully and exhaustively collected, and, being from an undoubted oceanic area, cannot fail to be of interest. The marine collections fill in an almost unknown gap between the Red Sea and the East Indies, and are the most extensive ever obtained from any coral, oceanic area. The work will be published in eight parts, of which the first will appear in October next.

IN the last *Berichte*, Nencki and Marchlewski describe the very interesting discovery of the close chemical relationship existing between the red colouring matter of the blood and the green chlorophyll of plants. Hæmatoporphyrin a derivative of hæmoglobin, and phyllocyanin obtained from chlorophyll, both yield on reduction hæmopyrrol, which is probably an isobutyl or methyl propyl pyrrol.

IN the newly issued *Bulletin International de l'Académie des Sciences de Cracovie*, L. Bruner publishes the results of his dynamic investigations on the bromination of aromatic compounds. The dependence of the velocity of bromination on the nature and position of the substituting groups in the benzene ring has been studied, and especially the catalytic activity of the most important bromine "carriers." In respect of this capacity, aluminium, chromium, iron and thallium salts, compounds of antimony and phosphorus, and finally iodine have been investigated. It is found that the catalytic activity of the bromine "carriers" depends upon the nature of the substance which is being brominated, so that the arrangement of these bodies in a general series according to their activity is not possible. For benzene and bromobenzene the order is (1) aluminium, (2) thallium, (3) iron salts, (4) iodine, (5) antimony, (6) phosphorus halogens.

THE additions to the Zoological Society's Gardens during the past week include two Green Monkeys (*Cercopithecus callitrichus*) from West Africa, presented respectively by Mr. R. de Courcy Hickton and Mr. S. Prust; a Macaque Monkey (*Macacus cynomolgus*) from India, presented by Mrs. Mould; a Crab-eating Raccoon (*Procyon cancrivorus*) from South America, presented by Mr. B. W. Gardom; a Cuckoo

(*Cuculus canorus*), British, presented by Lieut.-Colonel J. S. Benyon; an Alligator (*Alligator mississippiensis*) from North America, presented by Mr. W. Phillips; two Moccasin Snakes (*Tropidonotus fasciatus*) from North America, presented by Captain J. B. Gilliat; a Great Wallaroo (*Macropus robustus*), four Bridled Wallabies (*Onychogale frenata*) from Australia, two Parrot Finches (*Erythrura psittacea*) from New Caledonia, two Grey-headed Porphyrios (*Porphyrio poliocephalus*), two Ceylonese Terrapins (*Nicoria trijuga*) from India, five Derbian Sternotheres (*Sternotherus derbianus*) from West Africa, two Grey Monitors (*Varanus griseus*) from North Africa, deposited; two Griffon Vultures (*Cygs fulvus*), European, received in exchange; a Wapiti Deer (*Cervus canadensis*), three Glossy Ibises (*Plegadis falcinellus*), bred in the Gardens.

OUR ASTRONOMICAL COLUMN.

LIGHT VARIATION OF THE MINOR PLANET (345) TERCIDINA.—In the *Astronomische Nachrichten* (Bd. 156, No. 3726), Herr J. Hartmann gives an account of his investigations of the variation in brightness of this small planet, first pointed out by Prof. Max Wolf, of Heidelberg, in 1899 (*Astronomische Nachrichten*, No. 3704). Two photographs were obtained on April 20 and a third on April 22, all with the large Potsdam refractor. Reproductions are given showing the trails of the planet with reference to the neighbouring stars. The period deduced is as follows:—

Beginning of increase	... 9h. 0m.	} 4h. 10m. = 250m.
Culmination	... 10h. 14m.	
End of increase	... 13h. 10m.	

In the same journal Prof. Max Wolf gives a reproduction of a photograph taken with a 6-inch Voigtlander objective on April 22, the period determined from this being about 240m., which is in close agreement with that determined from the Potsdam photographs. The value determined from the older observations on 1899 November 4 was 290 minutes.

UNITED STATES NAVAL OBSERVATORY.—The recent issue of vol. i. of the second series of *Publications* of the U.S. Naval Observatory contains the first results of work done at the institution since the removal from the old site and the re-mounting of the instruments at the new observatory. In this volume a new method of publication is initiated, the observations made with one instrument and extending over several years being given together instead of all observations being published annually. This first volume contains the reduced observations of the sun, moon, planets and many miscellaneous stars made with the 9-inch and 6-inch transit circles during the years 1894-1899.

THE COMPTOMETER.¹

IN acceding to the editor's request to contribute an article to NATURE upon this instrument, I should like at the outset to express the feeling of curiosity with which any one, familiar with the many arithmometers now so generally in use, must introduce himself to the examination of the comptometer. He will probably know before he begins that it is a mere adding machine; that whereas any arithmometer at each turn of the handle adds or subtracts, as the case may be, any figure set upon the machine, no matter how many digits within the capacity of the machine there may be, or how many times, or how fast within the capacity of the operator he may turn the handle, so that by means of the shifting result-slide multiplication and division can be performed at a rate, and without mental effort, that is a tax upon our imagination, the comptometer is a mere adding machine in which the operator acts upon one key at a time, which adds, each time he presses it, the number on its head to the corresponding digit on the register below. While, therefore, the machine is evidently well adapted for addition, which is so simple an operation that most people believe an instrument for the purpose is not worth the expense of purchasing, it would appear at first that the process of multiplying, to be explained shortly,

¹ Chicago, U.S.A.: Felt and Tarrant Manufacturing Co. Manchester: The Calculating Machine Co.